THE FLORA OF WALLER CREEK, AUSTIN, TEXAS

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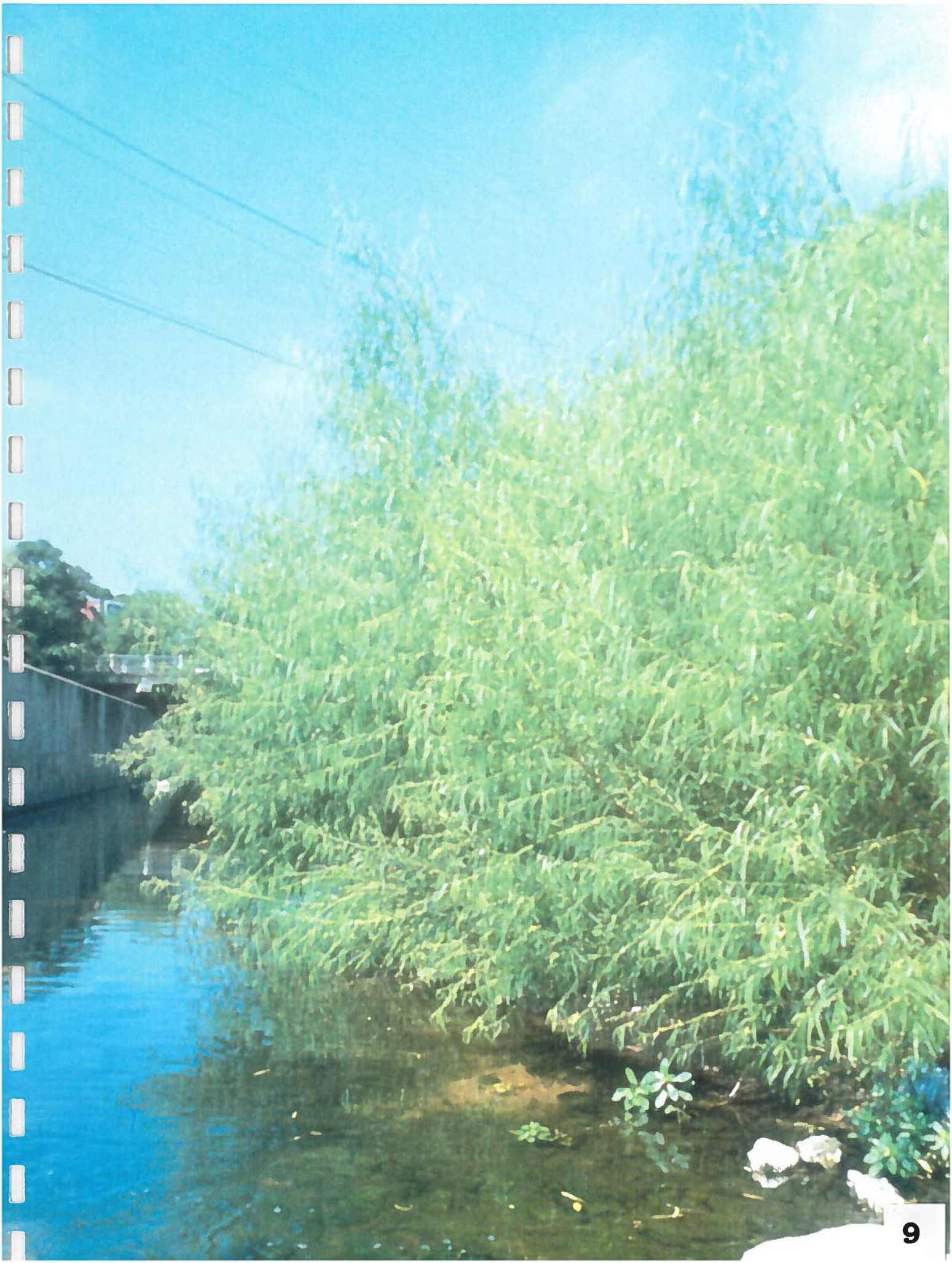

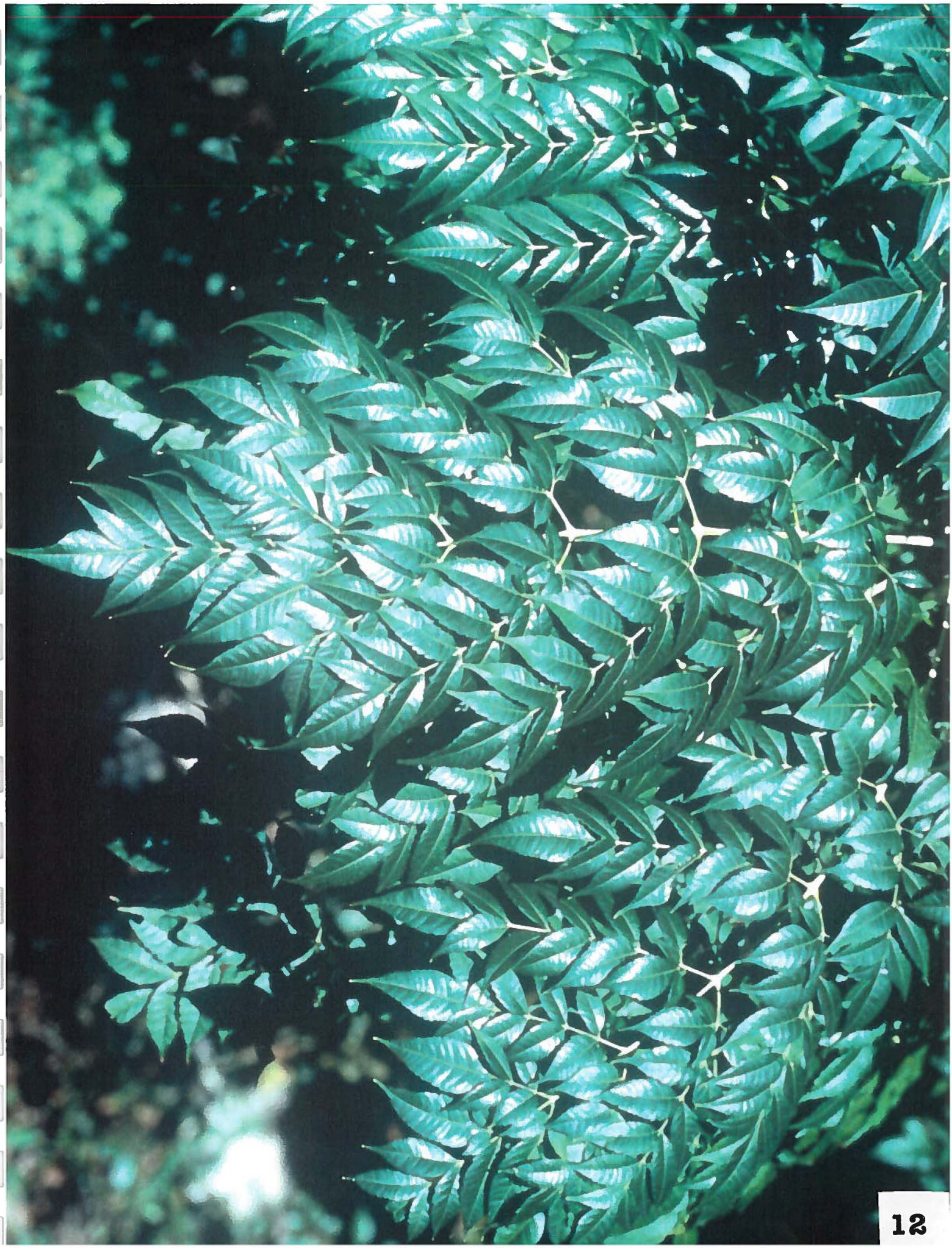

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INTRODUCTION

Waller Creek is an urban creek situated in Austin, Texas. It runs for seven miles in a north-south direction west of Interstate 35. The mouth of the creek is located on the northern bank of the Colorado River just west of the interstate (see fig. 1). The creek is geologically based on Cretaceous limestone known as Austin Chalk which is very common in the area. The creek runs through both heavy-usage urban and suburban areas and is often surrounded by impermeable surfaces. These contribute to rapid run-off resulting in high flow rates even with minimal precipitation. High flow rates then lead to severe erosion and siltation problems. Floristically, the creek is in many areas dominated by weedy species as one would expect of a disturbed urban area.

The main purpose of this study is to present a plant survey of Waller Creek. Also, attention to plants with biorevetment possibilities is addressed, and plant distribution as affected by water quality is also considered.

METHODS

The entire creek was explored beginning at the mouth and proceeding towards the head. Every flowering species was collected as it was encountered, along with those species that were identifiable vegetatively. Plants were collected from the stream bed to 15 feet from the tops of the banks. Both native and escaped plants were collected unless they were obviously part of a cultivated area. No qualitative data were recorded but subjective observations on relative abundance were made. However, it should be noted that abundance of herbaceous annuals fluctuates depending on seasonal variation. The terms used for relative abundance (from least to most abundant) were occasional, frequent, common, and abundant.

The survey had several limitations. First, the study period did not include an entire growing season but only extended from June to December. Therefore, no spring annuals are represented in this study although they may well constitute a large part of the creek flora. Secondly, only annuals that were flowering were collected for identification except for those familiar enough to identify without flowers or fruits. Most shrubs and trees, however, were identifiable by vegetative characteristics or existing fruits or flowers.

RESULTS AND DISCUSSION

Floristic Survey

A total of 96 different species were collected and identified (see table 1). These species are distributed among 49 families. Most families contain only two or three species. However, some families are more abundantly represented. The Poaceae (Grass Family) is the most commonly represented family and has ten species followed by the Asteraceae (Sunflower Family) which is represented by eight. The Fabaceae (Legume Family) is represented by five species, and the Moraceae (Mulberry Family) and Vitaceae (Grape Family) by four. Forty-two of the species are herbaceous and the remaining 54 are either trees, shrubs or vines. Seventy-seven of the species are dicots, and 17 are monocots, ten of which are grasses. Two of the species are gymnosperms.

The creek can be divided into three characteristic sections: the lower section begins at the mouth and extends to 26th street (see fig. 1); the middle section extends from 26th street to North Loop Boulevard; and the upper section stretches from North Loop Boulevard to the head at St. Johns Avenue.

The lower section runs through downtown Austin, and through the east side of the University of Texas campus. This section is surrounded by concrete and asphalt, and has many outfalls of questionable origin. The stream is therefore subjected to large amounts of oily run-off along with other pollutants from surrounding streets and parking lots. This part of Waller also has some of the most severe erosion problems. There are several places where erosion has resulted in 10 to 15 foot sheer banks with large trees succumbing to erosion. Not only is the creek subject to disturbance by erosion, but also by foot traffic of university students and urban dwellers. The lower section, however, also has some of the more aesthetically pleasing areas with an abundance of larger trees and shrubs creating shaded areas, over large, clear pools of water.

The middle section runs through a suburban area. In many cases the banks are formed by residential property and have been reinforced by retaining walls of various types. The creek bed is generally more shallow in this section, and erosion is not as extreme as in the lower section.

The upper section becomes more ditch-like with a very regular, flat-bottomed, U-shaped profile in many parts. There are fewer residential lots fronting the banks. In many areas suburban streets parallel the stream, and the banks make up the street right of way. The upper section also appears to be more disturbed than other sections because of regular maintenance cutting.

Some plants are commonly found in all three sections. Several of these are well known weedy species of disturbed habitats. Ambrosia trifida (ragweed) is the most abundant species and is found in every section of the creek. It forms large, dense colonies and helps in erosion control during its growing season as an annual. Rhus toxicodendron (poison ivy) is also a widespread species, though not desirable, its dense populations contribute to erosion control. Two other species seen throughout the creek are Aster eulae (aster) and Sorghum halepense (Johnson grass). Several trees are also present throughout the creek. The more abundant ones are Ulmus crassifolia (cedar elm), Celtis laevigata (lowland hackberry), and Salix nigra (river willow). Dense stands of smaller willows in some places help in erosion control. Other trees found in all sections, but not in great abundance, are Fraxinus berlandiariana (Mexican ash), Fraxinus pensylvanica (red ash), Sapium sebiferum (Chinese tallow tree) and Melia azedarach (chinaberry). The last two are common introduced species found in Texas. Arundo donax (giant reed) is also found in thick stands aiding in erosion control since this plant forms thick, creeping rhizomes. Also of some benefit is a species of sedge, Cyperus sp. (see table 1) which forms small clumps at the water's edge or other waterlogged areas.

Certain plants are more common in only the lower section of the creek. Ludwigia peploides (seedbox) is one species whose abundance is confined mostly to this section. This plant is usually rooted in saturated soils and extends into the stream as a floating plant. It forms rhizomatous colonies and serves to control erosion. Ruellia brittoniana (wild petunia) is another species found in dense, rhizomatous stands at the water's edge in the lower section of Waller. It also acts to hold soil together on the lower banks of the creek. A native of eastern Mexico, Ruellia brittoniana is a common introduced escape in various areas in Texas. It occurs less frequently in the upper sections of the creek. Colocasia sp. (elephant ear) is a common plant which is found more often in just the lower section. It is an introduced aquatic species which has escaped and can be found around Austin in other aquatic habitats. Two trees that favor the lower section are Ailanthus altissima (tree of heaven) and Taxodium distichum (bald cypress). Ailanthus altissima is a tree that is commonly seen in urban settings. In several areas of the lower section, large bald cypress trees add a definite aesthetic value to the creek.

Some plants are found more often in the lower, and middle sections and are less frequent in the upper section. These are mostly the following trees: Platanus occidentalis (sycamore), Populus deltoides (cottonwood), Quercus virginianus (live oak), Carya illinoinensis (pecan), Morus alba (white mulberry), Acer negundo (box elder), Cercis canadensis (red bud), and Maclura

pomifera (osage orange). Also found in the lower and middle sections are Prunus caroliniana (Carolina cherry laurel), Ligustrum japonicum (Japanese privet), and Lonicera japonica (Japanese honeysuckle).

The middle section also has its characteristic plants. Perhaps because of the proximity of homes, there are cultivated plants in this section which appear to be growing as escapes. Though not found in abundance, these plants are Ligustrum amurense, Liquidamber styraciflua (sweet-gum), Hedera helix (English ivy), Arundinaria sp. (bamboo), and Ficus carica (common fig).

The upper section has a different physiognomy when compared to the rest of the creek. As mentioned before, it had a shallower, more regular shape than lower sections. It also does not have flowing water as often as other sections and overall diversity is lower. There are fewer trees in the upper section. This is probably caused by weeding and regularly scheduled maintenance. The upper section therefore has a much less wooded appearance in most areas and is much more weedy than the lower and middle sections.

Biorevetment

During the study several species of plants which naturally aid in controlling erosion were noted. However, popular biorevetment methods, such as brush layering, and live-staking, may not be feasible in most places on Waller Creek. These methods seem to work best where a large area is considered. If biorevetment is to be used, it would have to be done in very small pockets almost completely by hand; otherwise, existent diverse vegetation would be disturbed, and the natural character of the creek altered. Also, limited access to the creek precludes the use of heavy machinery in many areas.

If biorevetment is implemented on Waller Creek, Salix nigra (river willow) and Populus deltoides (cottonwood) would be appropriate species to use. Commonly used in live-staking, both of these species work well and naturally occur in the creek.

There are other species that were noted which might be used to stabilize soil. Arundo donax has been used by the highway department in many areas in Texas and could be used in Waller Creek. Since it is abundant in the creek, its use would not change the character of the creek. There are four herbaceous species that may also work in biorevetment. These could be used to stabilize soil at the water's edge since they all require moist soils. Both Ruellia brittoniana (wild petunia), and Ludwigia peploides (seedbox) are rhizomatous species which form large colonies in many areas on the creek. However, Ruellia brittoniana appears to grow in shaded areas and Ludwigia peploides in sunny areas. This should be considered in any biorevetment plans. One species of Cyperus is found frequently

in the creek. It forms clumps in saturated soils and may also be a good candidate for biorevetment. Tripsacum dactyloides (eastern gamagrass), a robust perennial that forms a large bunch and often has rhizomes, may also work well as a soil stabilizer.

Aquatic Macrophytes

Several aquatic species were noted. These are plants which grow submerged in water or in saturated soils. They are Ruellia brittoniana, Ludwigia peploides, Persicaria punctata, Cyperus sp.1 and Cyperus sp. 2, Bacopa monnieri (water-hyssop), Taxodium distichum (bald cypress), Cephalanthus occidentalis, (buttonbush), and Colocasia sp. (elephant ear). No association with water quality and these plants was noted.

It was decided that no correlations between water quality and these aquatic species could be assessed without a much more thorough investigation. Furthermore, such correlations may be hard to make since water quality probably varies to a large extent from time to time because parts of the creek are ephemeral and do not flow continuously throughout the year.

SUMMARY

Waller Creek is subject to many impingements and pressures as a result of its location in an urban/suburban area. Though many areas of the creek are aesthetically pleasing and floristically diverse, still others are dominated by weedy species that are traditionally considered undesirable. Attempts to eradicate these weedy areas are probably not only futile but may only serve to spread them further. If Waller Creek is to be returned to a more natural condition, a significant passage of time may be required. On the other hand, if a well studied comprehensive plan is implemented, this natural condition may be more quickly obtained.

This survey was done as part of the Citizens Monitoring program of the City of Austin. Funding was generously provided by the Environmental Protection Agency through the Texas Water Commission for a Nonpoint Source pollution control program and administered by the Environmental and Conservation Services Department, Austin, Texas.

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WALLER CREEK WATERSHED

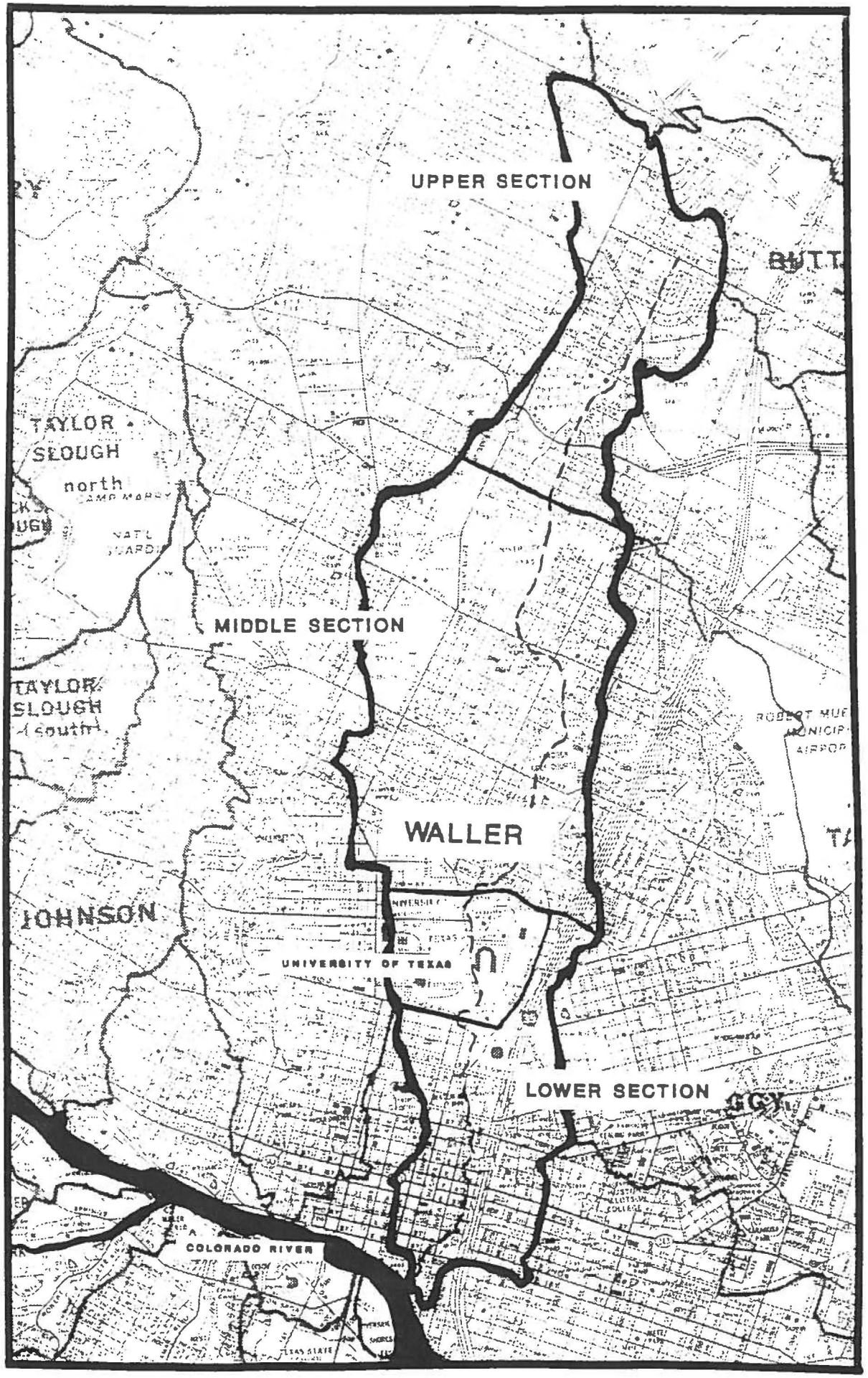

FIG. 1

Table 1. PLANTS FOUND IN SURVEY OF WALLER CREEK
(O = OCCASIONAL F = FREQUENT C = COMMON A = ABUNDANT)

	SPECIES	FAMILY	COMMON NAME
1	*Acer negundo* (F)	Aceraceae	Boxelder
2	*Ailanthus altissima* (C)	Simaroubaceae	Tree of heaven
3	*Albizia julibrissin* (O)	Fabaceae	Mimosa-tree
4.	*Amaranthus* sp. (O)	Amaranthaceae	
5.	*Ambrosia psilostachya* (O)	Asteraceae	Western ragweed
6.	*Ambrosia trifida* (A)	Asteraceae	Ragweed
7.	*Ampelopsis arborea* (O)	Vitaceae	Pepper-vine
8.	*Andropogon glomeratus* (O)	Poaceae	Bushy beardgrass
9.	*Arundinaria* sp. (O)	Poaceae	Bamboo
10.	*Arundo donax* (A)	Poaceae	Giant reed
11.	*Aster eulae* (C)	Asteraceae	Aster
12.	*Bacopa monnieri* (O)	Scrophulariaceae	Water-hyssop
13.	*Boerhaavia* sp. (O)	Nyctaginaceae	Spiderling
14.	*Bothriochloa ischaemum* (O)	Poaceae	
15.	*Broussonetia papyrifera* (F)	Moraceae	Paper mulberry
16.	*Calyptocarpus vialis* (F)	Asteraceae	
17.	*Campsis radicans* (O)	Bignoniaceae	Trumpet honeysuckle
18.	*Carya illinoinensis* (F)	Juglandaceae	Pecan
19.	*Celtis laevigata* (C)	Ulmaceae	Lowland hackberry
20.	*Cephalanthus occidentalis* (O)	Rubiaceae	Buttonbush
21.	*Cercis canadensis* (O)	Fabaceae	Redbud
22.	*Chenopodium ambrosiodes* (O)	Chenopodiaceae	
23.	*Clematis dioscoreifolia* (O)	Ranunculaceae	Yam-leaf virgin's bower
24.	*Clematis pitcheri* (O)	Ranunculaceae	Leather flower
25.	*Cocculus carolinus* (O)	Menispermaceae	Carolina moonseed
26.	*Colocasia* sp. (F)	Araceae	Elephant ear
27.	*Commelina erecta* (C)	Commelinaceae	Day flower
28.	*Cornus drummondii* (O)	Cornaceae	
29.	*Cyperus* sp. (F)	Cyperaceae	Flatsedge
30.	*Cyperus* sp. (O)	Cyperaceae	Flatsedge
31.	*Desmanthus illinoensis* (O)	Fabaceae	
32.	*Echinochloa crus-pavonis* (O)	Poaceae	
33.	*Eclipta alba* (O)	Asteraceae	Yerba de tago
34.	*Eleocaris* sp. (O)	Cyperaceae	Spikerush
35.	*Euphorbia dentata* (C)	Euphorbiaceae	
36.	*Ficus carica* (C)	Moraceae	Common fig
37.	*Fraxinus berlandieriana* (C)	Oleaceae	Mexican ash
38.	*Fraxinus pensylvanica* (F)	Oleaceae	Red ash
39.	*Gaura* sp. (O)	Onagraceae	
40.	*Hedera helix* (O)	Araliaceae	English ivy
41.	*Ilex decidua* (F)	Aquifoliaceae	Possum-haw
42.	*Ipomoea trichocarpa* (C)	Convolvulaceae	Alamo vine
43.	*Ipomoea sinuata* (O)	Convolvulaceae	
44.	*Iva annua* (A)	Asteraceae	Marsh-elder
45.	*Juglans nigra* (O)	Juglandaceae	Black walnut
46.	*Juniperus virginianus* (O)	Cupressaceae	Eastern red cedar
47.	*Kallstroemia parviflora* (O)	Zygophyllaceae	
48.	*Lantana horrida* (O)	Verbenaceae	Texas lantana
49.	*Ligustrum amurense* (F)	Oleaceae	
50.	*Ligustrum japonicum* (O)	Oleaceae	Japanese privet
51.	*Liquidambar styraciflua* (O)	Hamamelidaceae	Sweet-gum
52.	*Lonicera japonica* (C)	Caprifoliaceae	Japanese honeysuckle
53.	*Ludwigia peploides* (F)	Onagraceae	Seedbox
54.	*Maclura pomifera* (O)	Moraceae	Osage orange
55.	*Malvaviscus arboreus* (F)	Malvaceae	Turk's cap
56.	*Melia azedarach* (F)	Meliaceae	Chinaberry
57.	*Mirabilis jalapa* (O)	Nyctaginaceae	Common four-o'clock
58.	*Morus alba* (F)	Moraceae	White mulberry
59.	*Panicum* sp. (O)	Poaceae	

TABLE 1 CONTINUED

60. *Parkinsonia aculeata* (O)	Fabaceae	Retama
61. *Parthenium confertum* (C)	Asteraceae	
62. *Parthenocissus quinquefolia* (O)	Vitaceae	Virginia creeper
63. *Paspalum urvillei* (F)	Poaceae	Vasey grass
64. *Persicaria punctata* (C)	Polygonaceae	
65. *Photinia* sp. (O)	Rosaceae	
66. *Phyla incisa* (O)	Verbenaceae	Texas frogfruit
67. *Platanus occidentalis* (F)	Plantaceae	Sycamore
68. *Populus deltoides* (F)	Salicaceae	Cottonwood
69. *Prunus caroliniana* (O)	Rosaceae	Carolina cherrylaurel
70. *Quercus stellata* (O)	Fagaceae	Post oak
71. *Quercus texana* (F)	Fagaceae	Texas red oak
72. *Quercus virginiana* (O)	Fagaceae	Live oak
73. *Rhus toxicodendron* (A)	Anicardiaceae	Poison ivy
74. *Rivinia humilis* (O)	Phytolacaceae	Pidgeon-berry
75. *Rubus* sp. (F)	Rosaceae	Dewberry
76. *Ruellia brittoniana* (C)	Acanthaceae	Wild petunia
77. *Ruellia nudiflora* (O)	Acanthaceae	Wild petunia
78. *Salix nigra* (C)	Salicaceae	River willow
79. *Sambucus canadensis* (O)	Caprifoliaceae	Common elderberry
80. *Sapium sebiferum* (O)	Euphorbiaceae	Chinese tallow tree
81. *Sesbania macrocarpa* (O)	Fabaceae	Bequilla
82. *Setaria geniculata* (O)	Poaceae	
83. *Sida* sp. (O)	Malvaceae	
84. *Smilax bona-nox* (F)	Liliaceae	Cat-briar
85. *Solanum americanum* (O)	Solanaceae	
86. *Solidago altissima* (O)	Asteraceae	Goldenrod
87. *Sorghum halepense* (A)	Poaceae	Johnson grass
88. *Taxodium distichum* (F)	Taxodiaceae	Bald cypress
89. *Tripsacum dactyloides* (O)	Poaceae	Eastern gamagrass
90. *Typha* sp. (O)	Typhaceae	Cat-tail
91. *Ulmus americana* (O)	Ulmaceae	American elm
92. *Ulmus crassifolia* (C)	Ulmaceae	Cedar elm
93. *Vinca major* (O)	Apocynaceae	
94. *Vitex angus-castus* (O)	Verbenaceae	Chaste-tree
95. *Vitis cinerea* (O)	Vitaceae	Graybark grape
96. *Vitis mustangensis* (O)	Vitaceae	Mustang grape

Photographs of the Flora of Waller Creek, Austin, Texas

Robert J. George

I. Species found in all three sections of the creek.

A. Common weedy species.

1. Ambrosia trifida (ragweed)
2. Ambrosia trifida (ragweed)
3. Rhus toxicodendron (poison ivy)
4. Calyptocarpus vialis (dwarf lawn sunflower)
5. Sorghum halepense (Johnson grass)
6. Aster eulae (aster)

B. Common trees.

7. Ulmus crassifolia (cedar elm)
8. Celtis laevigata (lowland hackberry)
9. Salix nigra (river willow)
10. Salix nigra (river willow)
11. Fraxinus sp. (ash)
12. Melia azedarach (chinaberry)
13. Melia azedarach (chinaberry)
14. Sapium sebiferum (Chinese tallow tree)

C. Other common species.

15. Arundo donax (giant reed)
16. Arundo donax (giant reed)
17. Cyperus sp. (flatsedge)

II. Plants indicative of the lower section of the creek.

18. Ludwigia peploides (seedbox)
19. Ludwigia peploides (seedbox)
20. Malvaviscus arborea (Turk's cap)
21. Ruellia brittoniana (wild petunia)
22. Ruellia brittoniana (wild petunia)
23. Colocasia sp. (elephant ear)
24. Ailanthus altissima (tree of heaven)
25. Ailanthus altissima (tree of heaven)
26. Taxodium distichum (bald cypress)

III. Plants indicative of the lower and middle sections.

27. Platanus occidentalis (sycamore)
28. Populus deltoides (cottonwood)
29. Quercus virginiana (live oak)
30. Carya illinoinensis (pecan)
31. Morus alba (white mulberry)
32. Acer negundo (boxelder)
33. Cercis canadensis (redbud)

34. Maclura pomifera (osage orange)
35. Prunus caroliniana (Carolina cherry laurel)
36. Ligustrum japonicum (Japanese privet)
37. Lonicera japonica (Japanese honeysuckle)

IV. Plants indicative of the middle section.

38. Ligustrum amurense (amure privet)
39. Hedera helix (English ivy)
40. Vitis mustangensis (mustang grape)
41. Liquidambar styraciflua (sweet-gum)
42. Liquidambar styraciflua (sweet-gum)